

PATENT APPLN. NO. 10/531,047  
SUBMISSION UNDER 37 C.F.R. § 1.114

PATENT

REMARKS

In the Final Action the Office has repeated the rejection made in the Office Action of January 7, 2009, of claims 1-29 under 35 U.S.C. § 103(a) as being unpatentable over Fukui in view of Hiroshi ISHIZUKA et al., JP 10-040958, machine translation (identified by the Office as "Hiroshi et al."). For convenience in discussing the 35 U.S.C. § 103(a) rejection in the present Action applicants will also refer to JP 10-040958 in the following remarks as "Hiroshi".

In the response filed April 7, 2009, to the Office Action of January 7, 2009, applicants argued that a person of ordinary skill in the art would not have been motivated from the combination of Fukui and Hiroshi to add carbon dioxide to the electrolyte of a battery in which the negative electrode is made by sintering a layer of active material particles which is a mixture of silicon particles and/or silicon alloy particles as in the present invention.

Applicants explained that Hiroshi does not disclose a negative electrode made by sintering a layer of a mixture of silicon particles and/or silicon alloy particles or which is otherwise comprised of silicon particles and/or silicon alloy particles. Hiroshi discloses that carbon dioxide is contained in a non-aqueous electrolyte of a non-aqueous secondary battery employing a non-

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crystal chalcogen compound and/or non-crystal oxide containing silicon as a negative electrode material (English Abstract).

Applicants argued that, in view of the different negative electrode active materials used in the batteries of Fukui and Hiroshi, a person of ordinary skill in the art could not have reasonably predicted the results of adding dissolved carbon dioxide as in Hiroshi to the electrolyte of the different battery of Fukui and would not have been otherwise motivated to add dissolved carbon dioxide gas to the electrolyte solution of the rechargeable lithium battery of Fukui.

Applicants further explained that an unexpected result of the present invention is the suppression of an increase in porosity of the negative electrode active material particles during charge and discharge (paragraph [0007] of the present specification). Hiroshi neither discloses nor suggests that an increase in porosity of negative electrode active material particles comprised of silicon particles and/or silicon alloy particles as in Fukui can be suppressed during charge and discharge by the addition of dissolved carbon dioxide to the electrolyte solution of the rechargeable lithium battery.

In the Final Action the office has taken the position that both Fukui and Hiroshi are "directed towards the same

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electrochemical cell with the same chemistry" (Final Action, page 8, lines 1 and 2); that the non-aqueous secondary battery of Hiroshi employing a non-crystal chalcogen compound and/or non-crystal oxide would not exclude the combination of Fukui and Hiroshi; and that a person of ordinary skill in the art would have combined the elements as claimed by known methods with no change in their respective functions, with the combination yielding nothing more than predictable results. The Office also noted that "the limitations of an increase in porosity of the negative electrode comprised of silicon particles and/or silicon alloy being suppressed during charge or discharge are not present within the claims." (Final Office Action, page 8, lines 12-14).

Applicants maintain their position that, particularly in view of the different negative electrode active materials used in the batteries of Fukui and Hiroshi, a person of ordinary skill in the art could not have reasonably predicted the results of adding dissolved carbon dioxide to the electrolyte of the different battery of Fukui and would not have been otherwise motivated to add dissolved carbon dioxide gas to the electrolyte solution of the rechargeable lithium battery of Fukui. However, in order to place the claims in condition for allowance, claims 1, 3 and 26 have been amended to recite that the negative electrode active material

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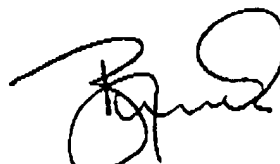
particles undergo a porosity increase that advances inside from particle surfaces during charge and discharge and that the increase in porosity of said particles during charge and discharge is suppressed. The limitation that the porosity of the negative electrode active material particles during charge and discharge is suppressed is supported in the specification of the application by the description in paragraph [0012].

Removal of the 35 U.S.C. § 103(a) rejection of the claims over Fukui in view of Hiroshi and a notice of allowability of the claims are in order and are respectfully requested.

The foregoing is believed to be a complete and proper response to the Office Action dated July 6, 2009.

Respectfully submitted,

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